

What is claimed is:

1. An incoming and outgoing call terminal on a duplicate private network, comprising:

an outgoing call transmission unit that receives a calling number, creates an outgoing call including information of the received calling number, and transmits the outgoing call to a gateway having a first private internet protocol (IP) address, which is an address of a relay of the duplicate private network, if a second private IP address, which is an address of an exit of the duplicate private network, is allotted to the incoming and outgoing call terminal;

an outgoing call setting requesting message transmission unit that creates a message requesting the setting of an outgoing call and transmits the message to the gateway if the outgoing call transmission unit transmits the outgoing call to the gateway; and

an incoming call reception unit that receives an incoming call from the gateway if the second private IP address allotted to the incoming and outgoing call terminal is an incoming internal private IP address, which is translated from an incoming internal public IP address by a network address translator (NAT) server, wherein the incoming internal public IP address is destination information corresponding to called number information included in the incoming call and the address of an entrance of the duplicate private network.

2. The incoming and outgoing call terminal of claim 1 further comprising:

a private IP address allocation requesting message transmission unit that creates a message requesting private IP address allocation, including information of incoming and outgoing call terminals, directly connected to the gateway, to which private IP addresses are not allotted, and transmits the message to the gateway unless the second private IP address is allotted to the incoming and outgoing call terminal; and

a second private IP address allocation reception unit which is allotted the second private IP address from the gateway in response to the reception of the message requesting private IP address allocation.

3. The incoming and outgoing call terminal of claim 2, wherein the outgoing call and the incoming call are voice-over-IP (VoIP) calls.

4. The incoming and outgoing call terminal of claim 1 further comprising:

a private IP address deletion requesting message transmission unit that creates a message requesting private IP address deletion, including information of a private IP address that is no longer in use, and transmits the message to the gateway if the second private IP address allotted to the incoming and outgoing call terminal is no longer in use; and

a second private IP address deletion reception unit, from which the gateway deletes the second private IP address in response to the reception of the message requesting private IP address deletion.

5. The incoming and outgoing call terminal of claim 4, wherein the outgoing call and the incoming call are voice-over-IP (VoIP) calls.

6. A method of enabling an outgoing call and receiving an incoming call in an incoming and outgoing call terminal on a duplicate private network, comprising:

(a) receiving a calling number, creating an outgoing call including information of the received calling number, and transmitting the outgoing call to a gateway having a first private IP address, which is an address of a relay of the duplicate private network, if a second private IP address, which is an address of an exit of the duplicate private network, is allotted to the incoming and outgoing call terminal;

(b) creating a message requesting the setting of an outgoing call and transmitting the message to the gateway if the outgoing call is transmitted to the gateway; and

(c) receiving an incoming call from the gateway if the second private IP address allotted to the incoming and outgoing call terminal is an incoming internal private IP address, into which an incoming internal public IP address is translated by a network address translator (NAT) server, wherein the incoming internal public IP address is destination information corresponding to called number information included in the incoming call and the address of an entrance of the duplicate private network.

7. The method of claim 6 further comprising:

(d) creating a message requesting private IP address allocation, including information of incoming and outgoing call terminals, directly connected to the gateway, to which private IP addresses are not allotted, and transmitting the message to the gateway unless the second private IP address is allotted to the incoming and outgoing call terminal; and

(e) allotting the second private IP address from the gateway to the incoming and outgoing call terminal in response to the reception of the message requesting private IP address allocation.

8. The method of claim 7, wherein the outgoing call and the incoming call are voice-over-IP (VoIP) calls.

9. The method of claim 6 further comprising:

(d) creating a message requesting private IP address deletion, including information of a private IP address that is no longer in use, and transmitting

the message to the gateway if the second private IP address allotted to the incoming and outgoing call terminal is no longer in use; and

(e) the gateway deleting the second private IP address from the incoming and outgoing call terminal in response to the reception of the message requesting private IP address deletion.

10. The method of claim 9, wherein the outgoing call and the incoming call are voice-over-IP (VoIP) calls.

11. A method of enabling an outgoing call and receiving an incoming call in a gateway on a duplicate private network, comprising:

(a) receiving a message requesting setting of an outgoing call from an incoming and outgoing call terminal, to which a second private IP address, which is the address of an exit of the duplicate private network, is allotted, and transmits the message to a gatekeeper having an outgoing internal public IP address, which is translated by a network address translator (NAT) server from the second private IP address and is source information corresponding to calling number information included in an outgoing call and the address of an entrance of the duplicate private network, if a first private IP address, which is the address of a relay of the duplicate private network, is allotted to the gateway;

(b) transmitting the outgoing call to the gatekeeper in response to reception of the outgoing call from the incoming and outgoing call terminal if

the outgoing call setting requesting message transmission unit transmits the message requesting the setting of an outgoing call to the gatekeeper;

(c) receiving an incoming call from the gatekeeper and transmitting the received incoming call to all incoming and outgoing call terminals connected to the gateway on the duplicate private network if the first private IP address allotted to the gateway on the duplicate private is an incoming internal private IP address, translated from an incoming internal public IP address, which is destination information corresponding to called number information included in the incoming call; and

(d) receiving an incoming call from the gatekeeper and transmitting the received incoming call to an incoming and outgoing call terminal having the incoming internal private IP address and directly connected to the gateway if the first private IP address allotted to the gateway is not the incoming internal private IP address.

12. The method of claim 11 further comprising:

(e) creating a message requesting private IP address allocation, including information of incoming and outgoing call terminals to which private IP addresses are not allotted, and transmitting the message to a duplicate private network management server unless a first private IP address is allotted to the gateway;

(f) a dynamic host configuration protocol (DHCP) server allotting private IP addresses to the gateway in response to the reception of the message; and

(g) allotting the first private IP address, among the allotted private IP addresses, to the gateway; and

(h) allotting a second private IP address, among the allotted private IP addresses, to the incoming and outgoing call terminal directly connected to the gateway.

13. The method of claim 12 further comprising:

(i) receiving the message requesting private IP address allocation from the incoming and outgoing call terminal and transmitting the message to the duplicate private network management server if the first private IP address is allotted to the gateway, and there are no second private IP addresses yet to be allotted.

14. The method of claim 13, wherein if in step (i), there are second private IP addresses yet to be allotted, one of the second private IP addresses yet to be allotted is allotted to the incoming and outgoing call terminal, directly connected to the gateway, to which a second private IP address is not allotted.

15. The method of claim 14, wherein the outgoing call and the incoming call are voice-over-IP (VoIP) calls.

16. The method of claim 11 further comprising:

(e) creating a message requesting private IP address deletion, including information of a private IP address that is no longer in use, and transmitting

the message to a duplicate private network management server if the first private IP address allotted to the gateway is no longer in use; and

(f) deleting all the private IP addresses allotted from a dynamic host configuration protocol (DHCP) server to the gateway.

17. The method of claim 16, wherein the outgoing call and the incoming call are voice-over-IP (VoIP) calls.

18. The method of claim 11 further comprising:

(e) receiving the message requesting private IP address deletion from the incoming and outgoing call terminal if the first private IP address is allotted to the gateway;

(f) deleting a second private IP address from the incoming and outgoing call terminal when the message requesting private IP address deletion is received; and

(g) classifying the deleted second private IP address as a private IP address yet to be allotted, creating private IP address information, including a database of allotted private IP addresses and private IP addresses yet to be allotted, and transmitting the private IP address information to the duplicate private network management server.

19. The method of claim 18, wherein the outgoing call and the incoming call are voice-over-IP (VoIP) calls.



20. A method of enabling an outgoing call and receiving an incoming call in a gatekeeper on a duplicate private network, comprising:

(a) receiving a message requesting the setting of an outgoing call from a gateway having an address of a relay of the duplicate private network;

(b) setting a communication path connecting the gateway and an external incoming node in an external network, having an incoming external public IP address, which is translated by a network address translator (NAT) server from a private IP address of an incoming and outgoing call terminal that has transmitted the message requesting the setting of an outgoing call and is destination information corresponding to called number information included in an outgoing call and an address of an entrance of a duplicate private network, when the outgoing call setting requesting message reception unit receives the message requesting the setting of an outgoing call;

(c) receiving the outgoing call from the gateway and transmitting the received outgoing call to the external incoming node along the communication path for the outgoing call; and

(d) receiving an incoming call and transmitting the received incoming call to a gateway having the address of a relay of the duplicate private network, which is a private IP address translated from the incoming internal public IP address by the NAT server, if the gatekeeper has an incoming internal public IP address, which is destination information corresponding to called number information included in the incoming call that has been transmitted along a communication path by an external outgoing call node

through incoming call setting, and is the address of an entrance of a duplicate private network.

21. The method of claim 20, wherein the outgoing call and the incoming call are voice-over-IP (VoIP) calls.

22. The method of claim 20, wherein the external incoming node and the external outgoing call node are arbitrary gatekeepers in the external network.

23. A method of enabling an outgoing call and an incoming call in a duplicate private network management server, comprising:

(a) creating private IP address information, including a database of allotted private IP addresses and private IP addresses yet to be allotted, or receiving the private IP address information from a gateway having an address of a relay of the duplicate private network, and storing the received private IP address information;

(b) receiving a message requesting private IP address allocation, including information on which incoming and outgoing call terminals to which private IP addresses are not allotted, from the gateway;

(c) creating a private IP address allocation message based on the private IP address information in response to the reception of the message requesting private IP address allocation and transmitting the private IP address allocation message to a dynamic host configuration protocol (DHCP) server;

(d) receiving a message requesting private IP address deletion, including information on private IP addresses that are no longer in use, from the gateway;

(e) creating a private IP address deletion message based on the private IP address information, in response to the reception of the message requesting private IP address deletion, and transmitting the private IP address deletion message to the DHCP server; and

(f) updating the private IP address information in response to the private IP address allocation message or the private IP address deletion message.

24. A computer-readable recording medium, on which a program enabling the method of claim 6 is recorded.

25. A computer-readable recording medium, on which a program enabling the method of claim 11 is recorded.

26. A computer-readable recording medium, on which a program enabling the method of claim 20 is recorded.

27. A computer-readable recording medium, on which a program enabling the method of claim 23 is recorded.